BIER-TE Encapsulation
IETF 100, Singapore

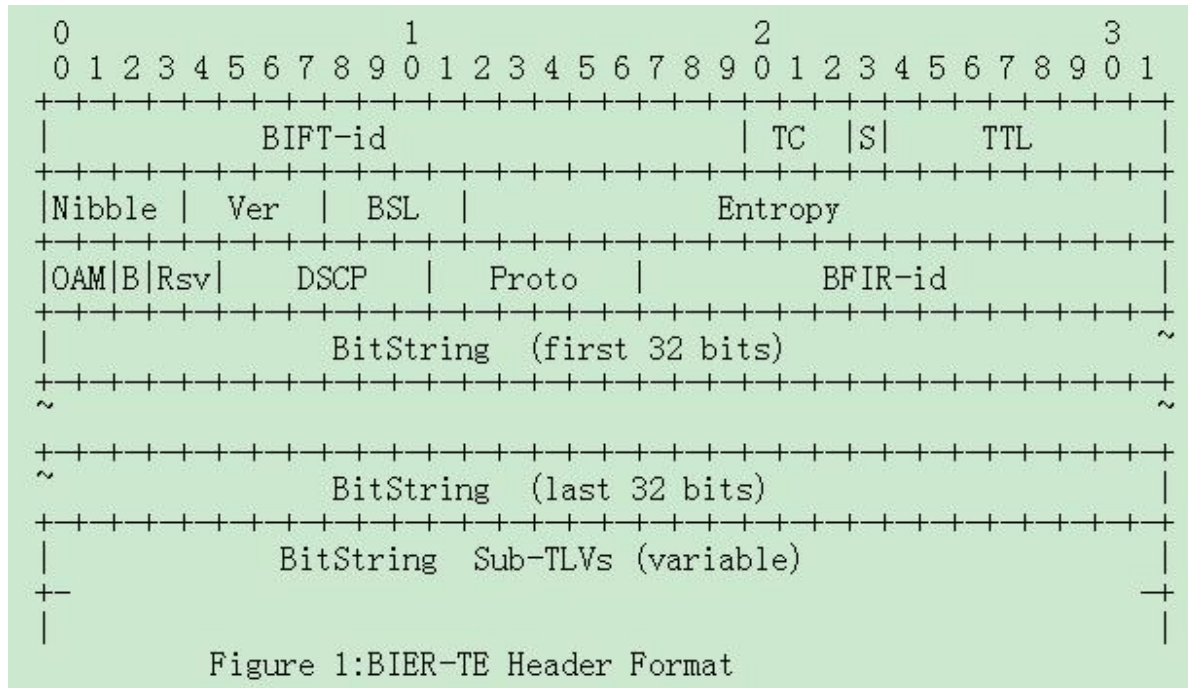Quan Xiong, ZTE
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Overview

- draft-xiong-bier-te-encapsulation-00

- 00 version provided in July 2017.

- This document proposes a set of extensions to BIER encapsulation for BIER-TE. The extensions define the BIER-TE header which contains one or more bitstrings and each bit in each bitstring represents one or more adjacencies in BIER-TE domain.

Motivation

- Traffic Engineering for Bit Index Explicit Replication (BIER-TE) shares part of architecture, definition and packet format with Bit Index Explicit Replication (BIER) according to the introductions in [I-D.eckert-bier-te-arch].[I-D.ietf-bier-mpls-encapsulation] specifies a BIER encapsulation that BIER header contains a bitstring in which each bit represents exactly one egress router in the domain.

- But in BIER-TE every BitPosition of the BitString of a BIER-TE packet indicates one or more adjacencies instead of an egress router as in BIER. That MUST be a huge number of adjacencies from BFIR to all BFERs and the BitString in BIER encapsulation is related to SD,BSL and SI combination. Then BPs of all adjacencies passing through BFIR to a BFER MAY be carried in more than one BitString.

BIER-TE Encapsulation

```
 0                   1                   2                   3
 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|             BIFT-id               | TC  |S|       TTL        |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|Nibble |  Ver  |  BSL  |                Entropy               |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|OAM|B|Rsv|    DSCP   |    Proto    |          BFIR-id          |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                 BitString  (first 32 bits)                  ~
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
~                                                              ~
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
~                  BitString  (last 32 bits)                   |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|               BitString  Sub-TLVs (variable)                |
+-                                                            -+
|                                                             |

        Figure 1:BIER-TE Header Format
```

New optional Sub-TLV is carried in the BIER-TE Header.

- B bit : 1bit, indicates BIER-TE packet when it is set.
- BitString Sub-TLV: identifies BitString related information and each BitString Sub-TLV corresponds to a particular combination of SD,BSL, SI and bitstring.
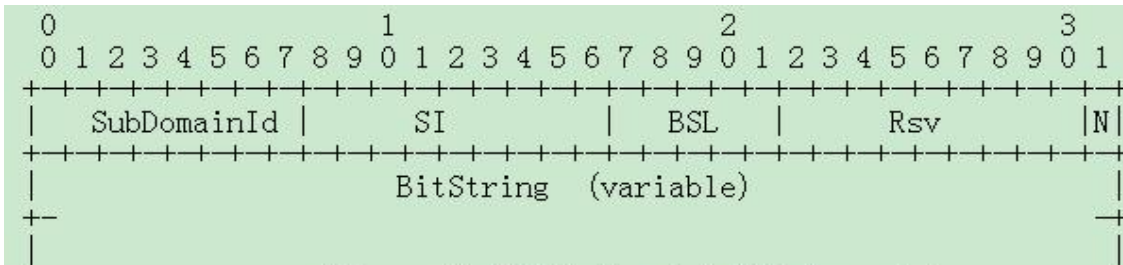
BitString Sub-TLV

```
 0                   1                   2                   3
 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|  SubDomainId  |       SI        |   BSL   |      Rsv      |N|
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                    BitString   (variable)                    |
+-                                                            -+
|                                                             |

               Figure 2: BitString Sub-TLV Format 1

 0                   1                   2                   3
 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                 BIFT-id                  |       Rsv      |N|
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                    BitString   (variable)                   |
+-                                                            -+
|                                                             |

               Figure 3: BitString Sub-TLV Format 2
```
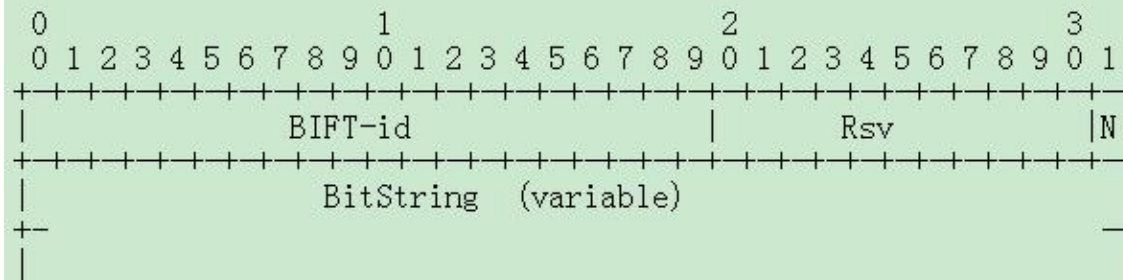
- SD : 8bits, indicates the Sub-DomainId of the BitString.
- SI : 10bits,indicates the Set Identification ofthe BitString.
- BSL : 4bits,indicates the length in bits of the BitString.
- N : 1bit, indicates that there are one or more BitString Sub-TLVs immediately preceding the TLV when it is set.
- BitString: variable, identifies the collection of the adjacencies from BFIR to all BFERs and each BitString is related to SD,BSL and SI combination or BIFT-id of the packet.
- BIFT-id: 22bits,The BIFT-id represents a particular Bit Index Forwarding Table (BIFT).

Example:BIRE-TE forwarding with BitString Sub-TLV

- Multicast flow is transmitted from BFIR to BFER1 and BFER2 and the Packet is encapsulated in a BIER-TE header with two BitString Sub-TLVs.
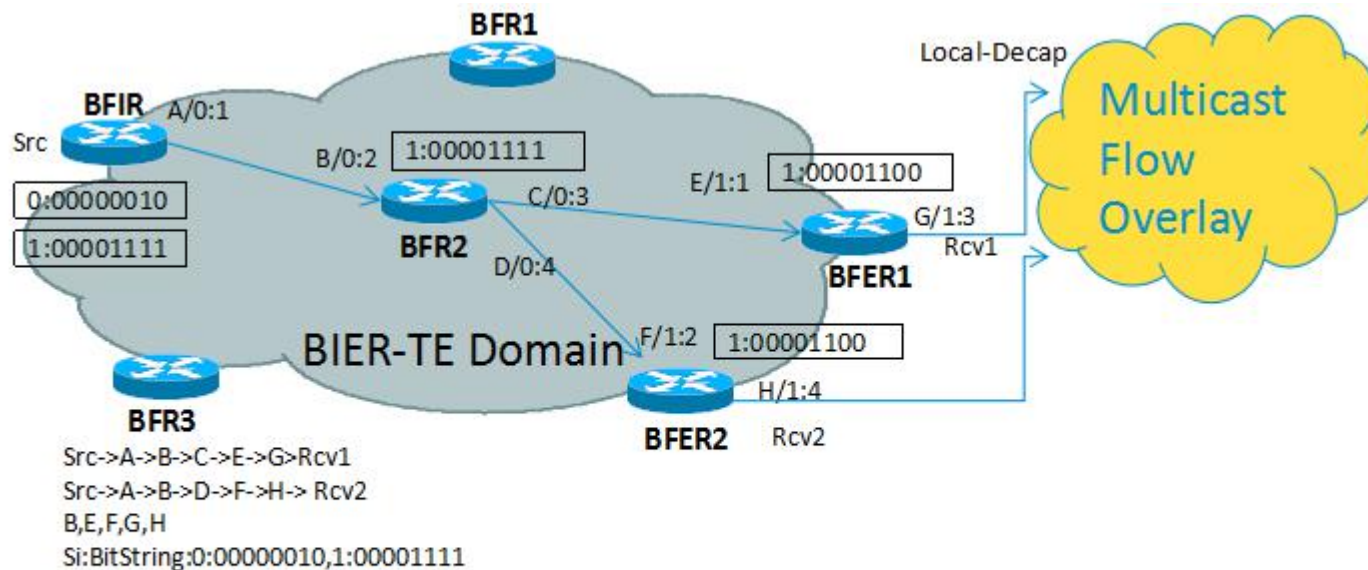
BitString Sub-TLV1(SubDomain=1,BSL=8,SI=0)
BitString Sub-TLV2(SubDomain=1,BSL=8,SI=1)

Next Steps

- Discussion with related drafts' Authors
- Review and comment and discussion
- Request WG Adoption